

CLAIMS

1. Device for confinement of plasma (5) in a chamber (1) comprising means of creating a magnetic field, the said means comprising a series of permanent magnets (3) capable of creating a magnetic field presenting an alternating multipole magnetic structure to the plasma, characterised in that the magnets (3) are capable of confining the plasma in a large volume, the magnets being discontinuously distributed around the volume, and in that the magnets (3) are arranged inside the chamber, at a distance from the walls of the chamber held in place by support rods (4), the support rods (4) extending along the axis of magnetisation of the said magnets and being arranged so that they are centred on the poles of the permanent magnets.

2. Device according to claim 1, characterised in that the support rods (4) extend perpendicular to the walls of the chamber.

3. Device according to either claim 1 or 2, characterised in that the series of permanent magnets (3) is in a discontinuous checkerboard type structure.

4. Device according to one of claims 1 to 3, characterised in that the series of permanent magnets (3) is in a discontinuous structure with interrupted line.

5. Device according to one of claims 1 to 4, characterised in that the permanent magnets (3) have a symmetry of revolution.

6. Device according to one of claims 1 to 5, characterised in that the permanent magnets are cylindrical.

7. Device according to one of claims 1 to 6, characterised in that the cross-section of the rods is small compared with the dimensions of the permanent magnets.

5        8. Device according to one of claims 1 to 6, characterised in that the support rods (4) are tubes, the permanent magnets being located inside the tubes (4) in the end extending into the chamber (1), each magnet comprising a plate or a disk (18) made of a material with high  
10       magnetic permeability on its face furthest back from the inside of the chamber (1).

9. Device according to claim 8, characterised in that the material is soft iron.

15       10. Device according to one of claims 1 to 9, characterised in that it comprises means of cooling the permanent magnets (3).

20       11. Device according to claim 10, characterised in that the cooling means comprise a supply-return circulation circuit for a fluid around each magnet, this circuit comprising a duct passing through the centre of the magnet.

12. Device according to one of claims 1 to 11, characterised in that the permanent magnets are contained in an external protective enclosure (16) that contains a non-magnetic conducting or dielectric material.

25       13. Device according to one of claims 1 to 12, characterised in that it comprises means of producing plasma that are independent of the confinement means.

30       14. Device according to claim 13, characterised in that the plasma production source is a structure with thermo-emissive filament excitation.

15. Device according to claim 13, characterised in that the plasma production source is a structure excited by application of an electric voltage with a given frequency and shape, to the gas, for a required application.

5        16. Device according to claim 13, characterised in that plasma production means contain means capable of applying a microwave electric field to the gas.

10       17. Device according to one of claims 1 to 12, characterised in that it comprises plasma production means that use at least a part of the confinement means.

18. Device according to claim 17, characterised in that the plasma production means are capable of applying an electric voltage with a determined frequency and shape to the confinement structure, for a required application.

15       19. Device according to claim 17, characterised in that the production means include means capable of applying an electric microwave field to the gas.